DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 16-21 have been considered but are moot in view of the new ground(s) of rejection. It should be noted that applicants' arguments were not persuasive. However, applicants' amendments further limiting the light transmissive material to "a liquid crystal material" overcame the examiners previous rejection. The layers, which the examiner interpreted to be “a tunable cladding layer”, are not made of "a liquid crystal material” as taught by Rosenblatt (U.S. Patent Number 5,337,183) or Friesem et al. (U.S. Patent Number 6,215,928). Both rejections have been withdrawn. However, in view of the amendment, the examiner has provided a new rejection.

Election/Restrictions

2. Claims 22-30 are still withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on July 31, 2007.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 16-17, 21, and 31- 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenblatt (U.S. Patent Number 5,337,183) in view of Sonehara (JP Publication Number 63-244004).

6. **With respect to claim 16**, Rosenblatt discloses an external-cavity tunable laser system configured to emit radiation at a laser emission wavelength (Fig. 5 element 50), comprising an external cavity having a plurality of cavity modes, said external cavity comprising (column 8 lines 55-56): a gain medium to emit an optical beam into the external cavity (Fig. 5 element 11); and a tunable optical resonant grating filter reflecting the optical beam at a resonant wavelength, said filter comprising (Fig. 5 element 50): a diffraction grating (Fig. 5 element 56); a planar waveguide optically interacting with said diffraction grating (Fig. 5 element 59 and column 2 lines 40-42 and column 8 line 63), the diffraction grating and the planar waveguide forming a resonant structure (column 9 lines 6-22). Rosenblatt does not explicitly disclose a light transmissive material having a selectively variable refractive index to permit tuning of the filter said light trnasmissive

material comprising a liquid crystal material so as to form a tunable cladding layer for the planar waveguide, wherein the planar waveguide is placed between the diffraction grating and the tunable cladding layer. However, Sonehara discloses a light transmissive material having a selectively variable refractive index to permit tuning of the filter (constitution lines 11-12), said light transmissive material comprising a liquid crystal material so as to form a tunable cladding layer for the planar waveguide (Fig. 1 elements 103 see also constitution line 3), wherein the planar waveguide is placed between the diffraction grating and tunable cladding layer (Fig. 1 elements 103, 101, and 104). The advantage is to allow for control of the coupling of light (constitution 6-12).

7. **With respect to claim 17**, Rosenblatt further discloses the emitted radiation is on a single longitudinal mode (Fig. 5 element 63).

8. **With respect to claim 21**, Rosenblatt further discloses the tunable resonant grating filter is arranged in the external cavity so that the optical beam impinges on the filter substantially perpendicular to a main surface of the planar waveguide (Fig. 5 element 11).

9. **With respect to claim 31**, Sonehara further discloses the selectively variable refractive index of the liquid crystal material is controlled by an electric signal (constitution lines 6-12).

10. **With respect to claim 32**, Sonehara further discloses two light transparent electrically conducting layers arranged on opposite sides of the light transmissive material for applying the electric signal across the light transmissive material (Fig. 1

elements 105 and 101). It is clear from the figure that elements 101 and 105 must both be light transparent and conduct electricity for the device of Sonehara to work.

11. **With respect to claim 33**, Rosenblatt in view of Sonehara does not explicitly disclose the tunable optical resonant grating filter exhibits a tunability within a tuning range of at least 10 nm. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a large tuning range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. It should be stated that a large tuning range is understood in the art to be beneficial, as it increases the flexibility of uses for the laser.

12. **With respect to claim 34**, Rosenblatt discloses an external-cavity tunable laser system configured to emit radiation at a laser emission wavelength (Fig. 5 element 50), comprising an external cavity having a plurality of cavity modes, said external cavity comprising (column 8 lines 55-56): a gain medium to emit an optical beam into the external cavity (Fig. 5 element 11); and a tunable optical resonant grating filter reflecting the optical beam at a resonant wavelength, said filter comprising (Fig. 5 element 50): a diffraction grating (Fig. 5 element 56); a planar waveguide optically interacting with said diffraction grating (Fig. 5 element 59 and column 2 lines 40-42 and column 8 line 63), the diffraction grating and the planar waveguide forming a resonant structure (column 9 lines 6-22). Rosenblatt does not explicitly disclose a light transmissive material having a selectively variable refractive index to permit tuning of the filter said light trnasmissive

material comprising a thermo-optical material having a thermo-optic coefficient of dn/dT of not less than $10^{-4}/^{o}C$ so as to form a tunable cladding layer for the planar waveguide, wherein the planar waveguide is placed between the diffraction grating and the tunable cladding layer. However, Sonehara discloses a light transmissive material having a selectively variable refractive index to permit tuning of the filter (constitution lines 11-12), said light transmissive material comprising a thermo-optical material having a thermo-optic coefficient of dn/dT of not less than $10^{-4}/^{o}C$ so as to form a tunable cladding layer for the planar waveguide (Fig. 1 elements 103 see also constitution line 3 and page 14 table 1), wherein the planar waveguide is placed between the diffraction grating and tunable cladding layer (Fig. 1 elements 103, 101, and 104). The advantage is to allow for control of the coupling of light (constitution 6-12). It should be noted that page 14 Table 1 discloses the liquid crystal to be MBBA. MBBA is a nematic liquid crystal. Nematic liquid crystals are known in the art to have especially high thermo-optic coefficients. Please see Ogusu et al. "Nonlinear Fiber Fabry-Perot Resonator Using Thermo-Optic Effect" page 1780 discloses MBBA to have a dn/dT of $3x10^{-4}\ K^{-1}$. Using unit analysis it is clear that $3x10^{-4}\ K^{-1}$ is equivalent to $3x10^{-4}\ ^{o}C^{-1}$. So while MBBA is generally considered an electro-optical material, it also is a thermo-optical material as the claim is written. In the interest of compact prosecution, the examiner has also provided Sidorin et al. (U.S. Pre-Grant Publication 2003/0214700) cited below which explicitly discloses that a person of ordinary skill in the art would easily recognize using either thermo or electro optical materials for granting refractive index control ([0206]).

13. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the device disclosed by Rosenblatt with the liquid crystal cladding layer as disclosed by Sonehara in order to provide for control of the coupling of light.

14. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenblatt (U.S. Patent Number 5,337,183) in view of Sonehara (JP Publication Number 63-244004) as applied to claim 16 above, and further in view of Tuganov et al. (U.S. Pre-Grant Publication 2003/0012237).

15. **With respect to claim 18**, Rosenblatt in view of Sonehara does not explicitly disclose further comprising a channel- allocation grid element arranged in the external cavity to define a plurality of pass bands substantially aligned with corresponding channels of a selected wavelength grid. However, Tuganov et al. discloses further comprising a channel- allocation grid element arranged in the external cavity to define a plurality of pass bands substantially aligned with corresponding channels of a selected wavelength grid ([0006]). The advantage is to allow the device to be used in optical communication devices ([0001]).

16. **With respect to claim 19**, Rosenblatt further discloses the distributed resonant cavity light beam modulator used for optical addressing (column 12 line 53).

17. **With respect to claim 20**, Rosenblatt in view of Sonehara does not explicitly disclose wherein the selected wavelength grid has a channel spacing of 50 GHz or 25 GHz. However, Tuganov et al. discloses wherein the selected wavelength grid has a channel spacing of 50 GHz or 25 GHz ([0001]).

18. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the device disclosed by Rosenblatt in view of Sonehara with the channel-allocation grid as disclosed by Tuganov et al. in order to allow the device to be used in optical communication devices.

19. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenblatt (U.S. Patent Number 5,337,183) in view of Sonehara (JP Publication Number 63-244004) as applied to claim 16 above, and further in view of Sidorin et al. (U.S. Pre-Grant Publication 2003/0214700).

20. **With respect to claim 35**, Rosenblatt in view of Sonehara do not explicitly disclose the thermo-optic material is a polymer. However, Sidorin et al. discloses thermo-optic polymers are known in the art to be useable in devices where refractive index control is needed ([0031]). Sidorin et al. also discloses the substitution of electro-optic materials for thermo-optic materials and vise-versa is known in the art ([0206]). It should be noted that the material disclosed by Sanehara can still be considered a thermo-optic material. However, the examiner does not believe it is proper to call it a thermo-optic polymer.

21. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thermo-optic polymer, since Sidorin et al. discloses that a person of ordinary skill in the art would recognize them as equivalents for the controlling the refractive index. Therefor, the art would have found it obvious to substitute MBBA for a thermo-optic polymer.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cavanaugh et al. (U.S. Patent Number 7,009,680) see Fig. 2. Wang (U.S. Patent Number 7,013,064) see Fig. 1. Revelli, Jr. et al. (U.S. Patent Number 5,347,377) see Fig. 2.

22. **Koyama et al. (U.S. Patent Number 7,343,064) see Fig. 2. While Koyama et al. does not constitute prior art it is considered extremely relevant to applicants disclosure.**

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSHUA KING whose telephone number is (571)270-

1441. The examiner can normally be reached on Mon.-Thurs. 10:00-7:30 and other Fri. 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Sun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JJK/

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